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SCOTT TURNER, DIRECTOR

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SAFETY ACHIEVEMENTS OF A PENNSYLVANIA BITUMINOUS COAL MINE AND OF A COAL MINE SUPERINTENDENT

BY

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SAFETY ACHIEVEMENTS OF A PENNSYLVANIA BITUMINOUS COAL MINE AND OF A COAL MINE SUPERINTENDENT[1]

By Francis Feehan[2]

INTRODUCTION

Safety first is no longer merely a motto; in some industries and in some parts of the mining industry it is an accomplished fact. In connection with the National Safety Competition of 1928 in which 284 mines and quarries participated, 42 plants were operated without a single lost-time accident. The winning company in the bituminous group had an accident severity rate of 0.053 per thousand man hours of exposure. Excellent safety records of various kinds are becoming more and more frequent, and the indication is that in reality safety is first in many mines and quarries. The safety achievements in the Stewart mine of W. J. Rainey, Inc., are unusual even among mines winning awards in the competition.

THE OPERATING COMPANY AND ITS POLICY

W. J. Rainey, Inc., is a commercial coal company, of which Scott Stewart is president; J. R. Maust, vice-president; D. D. Dodge, general superintendent; and Robert Wood, assistant. The main office is in the Vanderbilt Concourse Building, 52 Vanderbilt Avenue, New York, N. Y., and the operating office is at Uniontown, Pa.

At present the company is operating 11 mines in the Pittsburgh bed in Westmoreland, Fayette, Washington, and Greene Counties with 3,500 employees and an estimated production of 6,000,000 tons annually.

It is significant that this company has been operating in this district on a large scale since 1881, and although the mines are extremely gassy and a large number of major mine disasters have occurred in the district, no major disasters have taken place in the mines of the W. J. Rainey company during this period of nearly half a century.

The company has carried its own compensation insurance since the compensation law went into effect in January, 1916.

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[1] - The Bureau of Mines will welcome reprinting of this paper, provided the following footnote acknowledgment is used: "Reprinted from U. S. Bureau of Mines Information Circular 6258."

[2] - Mine Safety Commissioner.

Company Safety Policy

The safety policy of the organization is actively supported by every official from the president, vice president, and general superintendent down to the officials and employees at each mine.

A safety department is maintained and a thoroughly progressive safety director, F. S. Lenhart, is in charge. The central safety organization is headed by the general superintendent, his assistant, and other operating officials. The safety director is secretary, and under his direction at each monthly meeting, reports on the progress made at each mine in the promotion of safety are made and discussed.

A safety organization, maintained at each mine and headed by the mine superintendent in charge, is composed of the mine foreman and all other officials and employees that may be requested to attend.

Once a month and oftener if circumstances warrant, meetings are held at which time all matters relating to the safety of the employees are thoroughly discussed and action is taken for greater advancement in safety. The company safety director attends each monthly meeting, and informs the members of the best safe practices and aids in the solution of all safety problems presented.

Safety educational meetings of all employees at each mine are held about once each month or as often as is practicable. Company mine officials and the safety director arrange for and address such meetings.

The safe direction of the employees is given further attention by daily visits of mine officials to each workman. The company has definite safety rules, which are revised whenever it is deemed advisable and are rigidly enforced in so far as practicable.

Special attention is given to the safe direction of new employees; the practice of safety, and the observance of the State mining laws are made a condition of employment for both mine officials and employees.

One phase of the safety record of W. J. Rainey, Inc., for all mines during 1928 was that approximately 500,000 tons of coal were mined per fatality. The average production per fatality for Pennsylvania bituminous mines for the same period was 255,603, and for the United States it is estimated to be 264,331; hence this company produced nearly twice as much coal per fatality as did the average mining company in the bituminous mines of Pennsylvania or of the United States.

DESCRIPTION OF THE STEWART MINE

The Stewart mine, named after Scott Stewart, president of the company, is situated at Southwest, Westmoreland County, 10 miles south of Greensburg.

The hoisting shaft is 185 feet and the air shaft 225 feet deep. The tipple is of steel construction with a large concrete bin having a capacity of 1,000 tons. The coal is automatically dumped from the mine cars at the hoisting shaft into the bin. The coal from this bin is conveyed by 8-ton electrically operated lorries on a special track over a distance of 700 feet to the steel railroad tipple where the coal is dumped into railroad cars and dispatched.

The shaft was sunk in 1920 and coal shipments began in January, 1921. This mine has operated continuously since it was opened. The solid coal area available has been worked out, and for the past year or more, coal production has come from entry pillars which have been extracted to within a few hundred yards of the shaft bottom.

The 200 men employed at present work on three consecutive shifts, and the company officials expect the Stewart mine to be depleted and abandoned in 1930.

Gas Conditions

The Stewart mine has been classified as gassy by the Pennsylvania Department of Mines since it was opened in 1921. Approved electric cap lamps and permissible explosives have always been used.

System of Mining

The coal bed has a nearly uniform thickness of 9 feet, and lies practically flat except for infrequent occurrences of local sags in the strata. The coal is soft and friable except near the roof, where it is considerably harder; it is reasonably free from impurities. About 1 foot of draw slate and several feet of intermixed roof coal and slate immediately overlie the bed.

The prevailing practice in this district of leaving 6 to 12 inches of top coal for roof support has been followed at this mine. The room-and-pillar system of mining is used. Rooms are driven narrow, and the room pillars are extracted to the entry pillars on the retreat system.

For the first five years this mine was in operation, air-punching machines were used for undercutting. Since they were removed, hand-pick mining has been employed. At present splitting methods are used on pillars and the coal is overcut by hand picks about 8 inches from the top of the bed. Blasting is done by holes placed near the bottom.

System of Haulage

Electric trolley locomotives are used on the main haulage, and horses are used for gathering from the working places.

SAFETY RECORD OF THE STEWART MINE

The very good safety record of the Stewart mine extending over a period of nearly nine years of operation, with its large production and large number of man hours of labor, is probably unexcelled in the history of coal mining in the United States or in any other country in so far as is indicated by available records.

Certificate of Honor Presented

This record attracted the attention of the officials of the Joseph A. Holmes Safety Association, and at its annual meeting in Washington, D. C., on March 5, 1928, the following Certificate of Honor was awarded:

> The Joseph A. Holmes Safety Association
> Awards to the Stewart Mine, W. J. Rainey, Inc.,
> Southwest, Pennsylvania, This
> Certificate of Honor
>
> For having operated without a fatality or an accident entailing permanent or partial disability from January 1, 1921, to February 20, 1928. From January 1, 1921, to December 31, 1927, an average force of 266 men were employed, production being 2,991,831 tons and hours of exposure 3,825,680.
>
> Given in the City of Washington in the District of Columbia the 5th day of March Nineteen Hundred and Twenty-Eight.
>
> In Witness whereof the Seal of the
> Association and the signature of the
> President thereto are hereunto affixed.
>
> SCOTT TURNER
> President of the Joseph A. Holmes Safety Association

SAFETY STATISTICS

The data given in the Certificate of Honor extend to February 20, 1928; additional data given in Table 1 show that this extraordinary safety record has been continued to August 31, 1929. The record shows the noteworthy fact that from the beginning of operation of this mine in 1921 to August 31, 1929, notwithstanding the fact that practically 3,750,000 tons of coal had been produced involving more than 4,700,000 man hours of exposure, there had not been a fatality or a permanent total disability or even a permanent partial disability accident in the mine. Truly a wonderful record!

No Disabling Injury Period

Another notable achievement in the promotion of safety credited to the Stewart mine is that of operating for a period of seven months and eight days consecutively without a disabling injury to an employee.

TABLE 1. - SAFETY RECORD OF THE STEWART MINE PERIOD JANUARY 1, 1921 TO AUGUST 31, 1929

Year	Average employees	Total time worked by all employees, hours	No. accidents per million man hours of exposure	No. days lost per 1000 hours of exposure	Production short tons
1921	75	186,600	144.69	1.565	125,740
1922	125	311,000	38.585	1 219	192,104
1923	245	603,680	61.291	1.395	454,494
1924	290	721,520	44.351	.441	562,268
1925	265	646,600	30.931	.266	503,378
1926	260	676,880	22.161	.337	575,235
1927	270	679,400	11.775	.224	577,346
1928	220	566,575	7.060	.136	506,160
1929 (8 months)	200	314,084	9.552	.611	252,759
Total 8 years 8 months	1,950	4,706,339	33.572	0.564	3,749,484

Fatalities, injuries, and the number of lost days

	1921		1922		1923		1924		1925		1926		1927		1928		1929	
	Accidents	Lost days	Accidents	Lost days	Accidents	Lost days	Accidents	Lost days	Accidents	Lost days	Accidents	Lost days	Accidents	Lost days	Accidents	Lost days	Accidents	Lost days
Fatalities	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-
Permanent total disability	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-
Permanent partial disability	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-	0	-
Lost-time accidents compensable	8	208	4	333	15	743	10	224	6	113	6	174	3	113	3	75	3	192
Lost-time accidents noncompensable	19	84	8	46	22	99	22	94	14	59	9	55	5	39	1	2		
Total	27	292	12	379	37	842	32	318	20	172	15	229	8	152	4	77	3	192

Total compensable injuries	- 58	Lost days - 2,175
Total noncompensable injuries	- 100	Lost days - 478
Grand total	158	2,653

The injury that broke this record was the laceration of a finger of a workman, who remained idle for one day following the day he received the injury. The man claimed that he had remained absent from his employment to transact some personal business and not on account of the injury. If this had not occurred, the period probably would have been extended several additional months.

At the time this record was made it was the best of its kind known for a coal mine. Table 2 gives details:

Table 2.- Operation Data Covering Period in Which no Lost-Time Disabling Injuries Occurred at Stewart Mine, July 9, 1927 - February 17, 1928

Period	Work days	Shifts	Hours	Production, short tons
1927				
July 9 to 31	18	5,094	40,752	36,000
August	27	7,641	61,128	54,000
September	26	7,358	58,864	52,000
October	25	7,075	56,600	50,000
November	25	7,075	56,600	50,000
December	26	7,358	58,864	52,000
1928				
January	25	7,075	56,600	50,000
February 1 to 17	15	4,245	33,960	30,000
Total	187	52,921	423,368	374,000

Average number of employees: 283.

Average production daily: 2,000 tons.

GAS AND FIRE HAZARDS

The efficient control of the gas and fire hazard during the period that the Stewart mine has been in operation is evidenced by the perfect safety record maintained as regards accidents from fire and gas.

Although this mine has always been classified as gassy, it is a noteworthy fact that not even a local explosion of gas has occurred, not one workman has been even slightly burned with gas, not a workman has been overcome with black damp, and not one fire has occurred.

This record is more impressive when it is known that mine fires and local explosions which often result in the loss of one or more lives are of relatively common occurrence, and numerous major mine disasters in which five or more lives are lost have taken place in the Pittsburgh bed close to, or within a radius of approximately 30 miles of the Stewart mine. Table 3 lists some of these disasters.

Table 3.- Major mine disasters[1] in the Pittsburgh thick bed

Date	Name of mine	Place	Cause	Killed
Feb. 20, 1884	West Leisenring	West Leisenring	Explosion	19
Oct. 27, 1884	Youngstown	Uniontown	do.	14
June 16, 1890	Hill Farm	Dunbar	Mine fire	31
Jan. 27, 1891	Mammouth	Mount Pleasant	Explosion	109
Sept. 23, 1898	Umpire	Brownsville	do.	8
July 24, 1899	Grindstone	Grindstone	do.	5
Dec. 23, 1899	Sumner	Sumner	do.	19
June 10, 1901	Port Royal No. 2	Port Royal	do.	19
Nov. 21, 1903	Ferguson	Connellsville	do.	17
July 6, 1905	Fuller	Searight	do.	6
Oct. 13, 1905	Clyde	Frederickstown	Mine fire	6
Nov. 15, 1905	Braznell	Bentleyville	Explosion	7
Dec. 1, 1907	Naomi	Fayette City	do.	34
Dec. 19, 1907	Darr	Jacobs Creek	do.	239
Nov. 28, 1908	Rachel and Agnes	Marianna	do.	154
July 24, 1912	Superbo and Lemont	Evans Station	Cloudburst flooded mine	18
June 2, 1920	Ontario	Cokeburg	Explosion	6
Feb. 2, 1922	Gates No. 2	Brownsville	do.	25
July 25, 1924	Gates No. 1	Brownsville	do.	10
April 26, 1925	Hutchison	West Newton	do.	5
May 19, 1928	Mather No. 1	Mather	do.	195
Total number of employees killed				946
Total number of disasters				21

[1] - Major mine disasters are those in which five or more persons are killed

Comparative Statistics

A comparison of the safety record of the Stewart mine with the coal-mine death rates per million man hours worked, or what is commonly termed "hours of exposure," for Pennsylvania bituminous mines and the whole industry in the United States emphasizes the number of deaths that might have occurred at the Stewart mine during the years this safety record was established.

According to statistics available on this basis, the man hours of exposure given in Table 1 for the Stewart mine compared with the death rate per million man hours for Pennsylvania bituminous mines indicates that if the Stewart mine had had an average accident rate, 6.7 or in round numbers 7 deaths would have occurred during the life of the mine.

Compared with the death rate on this basis for the entire coal mining industry, 9.5 or in round numbers 10 deaths would have occurred.

Table 4 gives the possible reduction of fatalities in Pennsylvania bituminous mines and in the United States coal mines had fatalities been eliminated as was done at the Stewart mine. This table shows that if mining had been as safely prosecuted in all of the bituminous coal mines of Pennsylvania as in the Stewart mine there would have been a saving of 3,345 lives during the 8 years and 8 months of the good-record period at the Stewart mine.

Table 4.- Possible reduction of fatalities if all mines had the record of the Stewart mine

Year	Pennsylvania bituminous mines, number killed[1]	United States coal mines, number killed[2]
1921	286	1,995
1922	436	1,984
1923	402	2,462
1924	349	2,402
1925	309	2,234
1926	420	2,518
1927	356	2,231
1928	514	2,176
1929 (8 months)	[3]274	[3]1,329
Total 8 years, 8 months	3,346	19,321

1 - Data from Table 57, page 88, of U. S Bureau of Mines Bulletin 293, Coal-Mine Fatalities in the United States 1927, by W W. Adams

2 - Data from Table 1, page 3, same publication.

3 - Subject to revision.

Nonfatal Disabling Injuries

In the absence of reliable statistics showing the number of disabling injuries occurring in the coal-mining industry, an estimate of the number of nonfatal disabling injuries that might have occurred at the Stewart mine has been made.

According to statistics contained in Table 44 on pages 138 and 139 of the Eighth Annual Report of the Mines Department of Great Britain for the year ending December 31, 1928, 169 disabling injuries, each involving more than three days disability, occurred for each fatality in British coal mines. This number would be materially increased if all disabling injuries of one or more days lost time were included.

The National Safety Council in a recent publication (Accident Facts, 1929, p. 48) estimates the number of nonfatal lost-time injuries to be 130 for each industrial fatality.

United States Bureau of Mines Report of Investigations 2938, May, 1929, entitled "The National Safety Competition of 1928," on pages 7 and 8 gives the following data, based on the records of 66 bituminous mines participating in this contest: fatalities, 41; permanent total disability, 1; permanent partial disability, 64; temporary disabling injuries incurring loss of one or more days beyond date of injury, 2,384; grand total, 2,490. These data indicate that approximately 60 nonfatal injuries occurred for each fatality, and this figure will be used, as it appears to be based upon the most conservative and representative data available.

During the period of the safety record at the Stewart mine under discussion 6.7 deaths were prevented; this also represents 402 disabling lost-time injuries as the average for Pennsylvania bituminous mines. The Stewart mine had 158 disabling injuries, or 244 less than the average estimated for the Pennsylvania bituminous mines. On the same basis as for the United States, there would be an average of 570 disabling injuries, or the efforts made for safety at the Stewart mine prevented 412 disabling injuries to its workmen. It will be observed that there were no permanent total or permanent partial disabilities at the Stewart mine, and the average number of lost days per injury was extremely low, being slightly less than 17 days per injury.

ECONOMICS OF SAFETY AT THE STEWART MINE

An estimate of the economic savings effected during the period of this safety record at the Stewart mine is based only on such data from the Pennsylvania Workman's Compensation Law as are available.

During the years covered in this record, the waiting period after injury for which no compensation was paid was 10 days, until it was reduced to 7 days on January 1, 1928. The maximum weekly payment was $12 until it was increased to $15 on January 1, 1928.

The Annual Report of the Bureau of Workman's Compensation, 1928, by William H. Horner, director, published in the February, 1929, number of Labor and Industry, issued by the Department of Labor and Industry, Harrisburg, Pa., states that during the years 1921 to 1928, inclusive, 12,593 awards were made in fatal dependency cases, incurring an expenditure of $43,945,424 in compensation, or an average of $3,492.92 compensation per case. During this period awards were made in 603,548 compensation cases, involving $102,110,619 in compensation paid, or an average of $167.53 per compensation case.

On the basis of an average compensation payment of $3,492.92 per fatal dependency case, the prevention of 6.7 fatalities would alone effect a saving of $23,403, and the prevention of 9½ fatalities would save $33,183.

Of the 158 disabling lost-time injuries that occurred at the Stewart mine, 58 were classed as compensable cases. The total compensation paid by the company was $6,361. The average cost per compensable injury was $109. The average cost of compensation per ton of coal produced during the period from January 1, 1921, to August 31, 1929, based on $6,361 compensation paid and 3,749,484 tons of coal produced, was 1.7 mills. In many instances coal mines working under essentially similar conditions have compensation costs up to 5 cents or more per ton of coal produced.

Other economic losses which accompany fatalities and injuries to employees are less apparent and more difficult to estimate than compensation costs and are said by reliable safety engineers to be four times greater than the amount paid in compensation.

Compensation costs would include such items as administration of compensation, medical care, hospitalization, first-aid training and equipment, property damage, interruption of operations, replacement and training of new workmen, reduced morale, strained industrial relations, and similar expenses. All of these factors seriously affect the cost of production, are obscure, and are frequently overlooked by mine officials or mine owners.

The principal factors affecting economic losses to the employees from fatalities and injuries are as follows: loss of wages, physical impairment, reduced earning capacity, reduced initiative, discontentment, and similar factors, which probably total several times the dollars and cents actually received in compensation by employees.

It is not uncommon to find that the cost of workman's compensation payments alone averages 5 cents per ton of coal produced over a period of years at the mines of many companies operating in the bituminous fields; in some instances this figure is exceeded.

It is also evident that mining companies and mines that maintain low frequency fatality and injury rates through efficient organized safety effort have correspondingly low compensation costs per ton, and it almost invariably follows that the mine having the best safety record has also the lowest cost of operation and production compared with all other mines in the same coal bed of the district.

SAFETY METHODS AT THE STEWART MINE

In addition to rigid compliance with the State mining laws and the company safety policy, there are other factors that have contributed to the unexcelled safety record of the Stewart mine.

In conducting this investigation the writer went into the mine and visited a number of working places with mine foreman Smith, interviewed a number of employees, and talked with the State mine inspector of the district. All attribute this safety record to the efficient direction of the working force and the safety organization which was conducted so successfully that at all times there was a maximum of cooperation between the mine officials and the employees in the promotion of safety.

For the past year or more the mining hazard has been greatly increased by the overweight on the pillars that are being extracted. During the recent visit to the working places it was evident that this hazard was being controlled successfully by efficient timbering, and every workman seemingly was trained to safeguard himself from injury without constant direction from the foreman or his assistants.

The roof and other hazards on the haulageways were given constant attention; the haulageways were kept clean, and the haulage men as well as other day workers seemed to have the same interest in safety as the face workers.

The cleanliness and order maintained in the shops, hoisting and fan house, tipples and tracks, and everywhere on the outside was impressive, and it was evident that every worker was trying to perform his duties in the safest manner.

It has been a practice at this mine for the superintendent and the mine foreman or his assistant to visit each workman's place of employment at least two times at irregular intervals during each shift.

The practice of safety is made a condition of employment for all mine officials and employees. For infractions of the mining laws, the company safety rules, neglect of duty, or doing work unsafely, those found guilty are either reprimanded, suspended, or discharged, depending on the gravity of the offense. But seldom has an official or employee been either suspended or discharged, for Mr. Middleton, the superintendent, takes special pride in his ability to convert all employees under his direction to the practice of safety.

When new workmen are employed Mr. Middleton personally instructs them in the safety policy of the company and obtains a promise of cooperation. Special attention is also given to new employees by the assistant mine officials to be certain that they are safe and efficient workmen.

Sixty men have been trained in first aid since this mine was opened, and 25 have been trained in mine-rescue work. First-aid and mine-rescue equipment is always available.

The safety slogan of the W. J. Rainey company is much in evidence, and reads as follows:

Our Motto:

PRODUCTION WITH NO ACCIDENTS

Every official and workman at the mine and their families are as proud of the safety record established at the Stewart mine as is the superintendent upon whom the responsibility for the safety of the employees primarily rested.

SUPERINTENDENT MIDDLETON'S PART IN ACCIDENT PREVENTION

Upon reviewing the safety record of the Stewart mine, readers may form the opinion that it has had a preponderence of good luck, but consideration of the extended period of nearly nine years during which the record has been maintained should dispel such claims. Others will immediately reach the conclusion that the officials in charge of the mine must have experienced tremendous difficulties in making such an outstanding safety record. Such a conclusion is entirely incorrect, for when the writer interviewed Mr. Middleton on this subject the question was asked:

"Do you experience much difficulty in maintaining this high standard of safety that has prevailed at the Stewart mine."

He answered promptly:

"No, I regard it as the simplest problem connected with the successful operation of a coal mine."

Mr. Middleton's safety record as a mine official had been established long before he took charge of the Stewart mine, as will be shown by the following wording of the award of the Joseph A. Holmes Safety Association to Mr. Middleton in 1929:

> The Joseph A. Holmes Safety Association
>
> Awards to F. E. Middleton, Superintendent of Stewart and Perryopolis Mine, W. J. Rainey, Inc., Southwest, Pennsylvania this
>
> CERIFICATE OF HONOR
>
> For having acted from 1905 to 1919 as coal-mine foreman and from 1919 to 1929 as superintendent. During the entire 24 years only one fatal accident occurred to the 200 or more men under Mr. Middleton's direct jurisdiction.
>
> Given in the City of Washington in the District of Columbia the 5th day of March Nineteen Hundred and Twenty-Nine.
>
> In Witness whereof the Seal of the Association and the signature of the President thereto are hereunto affixed.
>
> SCOTT TURNER
> President of the Joseph A. Holmes Safety Association

Mr. Middleton's achievements and those of the Stewart mine in the promotion of safety are convincing proof that coal mining can be made a comparatively safe occupation and that there are no hazards connected with it that can not be successfully controlled by the proper application of human intelligence. It is to be hoped that his safety record and that of the Stewart mine will inspire all mine officials throughout the United States to put forth greater effort to bring about a substantial and permanent reduction in the excessively high fatality and injury rates prevailing in the mineral industries, and especially in coal mining.